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Applicant: Campagnolo et al.
Application No.: 10/690,042

IN THE CLAIMS

1. (Currently amended) A process for controlling when gear shifting occurs in a transmission of a cycle having at least one sprocket coaxially mounted to hub of a rear wheel of the cycle and a transmission chain engaged with said sprocket, the process comprising the steps of:

providing a sensor that detects a marker that rotates about an axis parallel to an axis of rotation of the at least one sprocket, said marker having angular positions corresponding to no, forward, and rearward movement of the transmission chain; and

selectively activating said sensor according to a command request to initiate a shift; and

preventing a shift when the sensor detects rearward movement of the chain.

2. (Currently amended) The process according to claim 1, further comprising the steps of preventing a shift when said sensor detects no movement ~~or rearward movement~~ in the transmission chain and allowing a shift when said sensor detects forward movement in the transmission chain.

3. (Cancelled)

Applicant: Campagnolo et al.
Application No.: 10/690,042

4. (Cancelled)

5. (Cancelled)

6. (Currently amended) ~~The system according to claim 5,~~

A system for controlling when gear shifting occurs in the transmission of a cycle, the system comprising:

at least one sensor that detects a marker that rotates about an axis parallel to an axis of a sprocket coaxial with a rear hub of a cycle wheel, said marker having angular positions that correspond to no, forward, and rearward movement of a transmission chain engaged to the sprocket; and

a control unit for activating said sensor according to a command request;

wherein said control unit is configured for preventing, in response to the corresponding signal, a gear shift when the sensor detects no or rearward movement of the transmission chain, and allowing, in response to the corresponding signal, a gear shift when the sensor detects forward movement of the transmission chain.

Applicant: Campagnolo et al.
Application No.: 10/690,042

7. (Currently amended) The system according to claim [[5]] --6--, wherein the at least one sensor is associated with a crank axle of the cycle, and rotation of the crank axle corresponds to the forward and rearward movement of the chain.

8. (Currently amended) The system according to claim [[5]] --6-, wherein said at least one sensor is associated to one of a crank axle of said cycle and a tensioning element.

9. (Currently amended) A method for controlling gear shifting on a bicycle having a plurality of gears with at least one gear including teeth with a sequence of differentiated geometries which define facilitating portions on said gear, the teeth carrying a transmission element, the method comprising the steps of:

a) detecting a processing signal representative of an affirmative shift command;

b) detecting an angular position of the at least one gear by detecting a marker that rotates about an axis parallel to an axis of a hub of a rear wheel in response to the processing signal, said marker having angular positions that correspond to no, forward, and rearward movement of a transmission chain engaged to the gear;

c) comparing the angular position of the at least one gear to the angular position of the facilitating portions of the at least one gear;

Applicant: Campagnolo et al.
Application No.: 10/690,042

d) shifting the transmission element from the at least one gear to another gear if (1) the detected angular position of the at least one gear corresponds to one of the facilitating portions-- and (2) if the transmission chain is not moving rearwards;[[,]]

wherein steps (b)-(d) are performed only after step (a).

10. (Previously presented) The method of claim 9, wherein the steps (a) – (d) are repetitively performed.

11. (Currently amended) A system for controlling gear shifting in a transmission of a cycle comprising at least one gear wheel on which is engaged a transmission element that performs transmission of motion as a result of its advance in a pre-determined direction; the gear shifting being carried out by changing the position of engagement of said transmission element with respect to said at least one gear wheel, wherein said at least one gear wheel has at least one given angular position in which the shifting of said element for transmitting motion is facilitated, said system comprising:

at least one sensor that detects a marker that rotates about an axis parallel to an axis of a rear wheel hub, said marker having an angular position

Applicant: Campagnolo et al.
Application No.: 10/690,042

corresponding to the position of said at least one gear wheel for generating a respective signal;

a control unit for controlling, starting from said respective signal, the change of the position of said element for transmitting motion;

at least one switch for selective activation of said at least one sensor according to a command for changing the position of said element for transmitting motion with respect to said at least one gear wheel; and

said control unit being configured for preventing shifting of said at least one gear wheel when the gear wheel is not (1) in an angular position corresponding to said at least one given angular position and (2) moving in a forward direction, and then allowing change of position of said transmission element when said at least one gear wheel is rotated to a next angular position corresponding to said at least one given angular position.

12. (Cancelled)

13. (Previously presented) The process of claim 1 further comprising providing a chain tensioner that engages the transmission chain, wherein the chain tensioner comprises the sensor.

Applicant: Campagnolo et al.
Application No.: 10/690,042

14. (Currently amended) The system of claim [[5]] --6- further comprising a chain tensioner that engages the transmission chain, wherein the chain tensioner comprises the sensor.

15. (Previously presented) The method of claim 9 further comprising providing a chain tensioner that engages the transmission chain, wherein the chain tensioner comprises the sensor.

16. (Previously presented) The system of claim 11 further comprising a chain tensioner that engages the transmission chain, wherein the chain tensioner comprises the sensor.

17-20. (Cancelled)

21. (Previously presented) A bicycle transmission controller for controlling gear shifts in a bicycle transmission by changing the engagement position of a motion transmission member with respect to a gear wheel when the motion transmission member is moving in a predetermined direction, the controller comprising:

Applicant: Campagnolo et al.
Application No.: 10/690,042

at least one sensor for detecting the direction of movement for a motion transmission member engaged with at least one gear and for generating an associated signal;

means for determining if the movement is in a predetermined direction of forward bicycle travel;

a command signal for controlling a change in position of the motion transmission member with respect to the gear wheel when the associated signal indicates that the motion transmission member is moving in the predetermined forward direction; and

an activation switch responsive to the command signal for changing the position of the motion transmission member with respect to the at least one gear when the motion transmission member is moving in the predetermined forward direction.

22. (New) The system of claim 6, wherein the sensor further comprises:

at least one rotary body with a marker element mounted thereon that rotates in conjunction with the rotary body; and

at least one pickup mounted in a position facing said rotary body and capable of generating at least one respective signal indicating the fact that, as a result of

Applicant: Campagnolo et al.
Application No.: 10/690,042

rotation about an axis of the rotary body, said marker element is in a position facing the pickup.

23. (New) The system according to claim 22 wherein said marker element has an angular extension of 180° with respect to said respective axis of rotation.

24. (New) The system according to claim 23 comprising two pickups set at a given angle apart from one another where the vertex of the said angle lies on said axis of rotation.

25. (New) The system according to claim 24 wherein said two pickups are set at an angle of 90° apart from one another where the vertex of the said angle lies on said axis of rotation.

26. (New) The system according to claim 22 wherein said marker element is made of magnetic material, such as plastoferrite.

27. (New) The system according to claim 22 wherein said gear wheel is a pulley associated to the chain-tensioner of a cycle and said marker element is incorporated in said pulley.

Applicant: Campagnolo et al.
Application No.: 10/690,042

28. (New) The system according to claim 22 wherein said pickup is mounted on the supporting element that supports said gear wheel.

29. (New) The system according to claim 28 wherein said pickup is mounted on the supporting element that supports said gear wheel and wherein said supporting element is one of the half-cages or arms of the chain-tensioner of the cycle.

30. (New) The system according to claim 22 wherein said pickup is selected from among a Hall-effect sensor or a reed relay.

31. (New) A process for controlling gear shifting in the transmission of a cycle comprising at least one gear that engages a transmission element that performs transmission of motion only during the transmission element's advancement in a forwardly direction; the gear shifting being carried out by changing the position of engagement of said transmission element with respect to said at least one gear, the process comprising the steps of:

detecting the angular position of said at least one gear;

Applicant: Campagnolo et al.
Application No.: 10/690,042

controlling change of position of said element for transmitting motion with respect to said at least one gear depending on the detected angular position;

providing sensor means for detecting the angular position of said at least one gear; and

selectively activating said sensor means according to a command request for changing the position of said element for transmitting motion with respect to said at least one gear.

32. (New) A process for controlling when gear shifting occurs in a transmission of a cycle having at least one gear, the process comprising the steps of:

assigning said at least one gear at least one given angular position in which shifting is facilitated only during forward movement of a transmission chain engaged to the at least one gear;

providing a sensor that detects a marker located coaxial to a crank axle that drives the transmission, the sensor detecting an angular position of the marker corresponding to the angular position of the at least one gear in which shifting is facilitated; and

selectively activating said sensor according to a command request to initiate a shift.

Applicant: Campagnolo et al.
Application No.: 10/690,042

33. (New) A system for controlling when gear shifting occurs in the transmission of a cycle, the system comprising:

at least one gear having at least one angular position in which shifting is facilitated during forward movement of a transmission chain engaged to the at least one gear;

at least one sensor that detects a marker located coaxial to a crank axle that drives the transmission, the sensor detecting an angular position of the marker corresponding to the angular position of the at least one gear in which shifting is facilitated and generating a corresponding signal; and

a control unit for activating said sensor according to a command request and preventing a gear shift during rearwards movement of the transmission chain.

34. (New) A method for controlling gear shifting on a bicycle having a plurality of gears with at least one gear including teeth with a sequence of differentiated geometries which define facilitating portions on said gears, the teeth carrying a transmission element, the method comprising the steps of:

a) detecting a processing signal representative of an affirmative shift command;

Applicant: Campagnolo et al.
Application No.: 10/690,042

b) detecting an angular position of the at least one gear by detecting a marker located coaxial to a crank axle of the bicycle, the detection step initiated in response to the processing signal;

c) comparing the angular position of the at least one gear to the angular position of the facilitating portions of the at least one gear;

d) shifting the transmission element from the at least one gear to another gear if the detected angular position of the at least one gear corresponds to one of the facilitating portions and if the transmission element is moving forward;

wherein steps (b)-(d) are performed only after step (a).

35. (New) A system for controlling gear shifting in a transmission of a cycle comprising at least one gear wheel on which is engaged a transmission element that performs transmission of motion, the gear shifting being carried out by changing the position of engagement of said transmission element with respect to said at least one gear wheel, wherein said at least one gear wheel has at least one given angular position in which the shifting of said element for transmitting motion is facilitated, said system comprising:

at least one sensor that detects a marker located coaxial to a crank axle that drives the transmission, the sensor detecting an angular position of the marker

Applicant: Campagnolo et al.
Application No.: 10/690,042

corresponding to the angular position of the at least one gear wheel for generating a respective signal;

a control unit for controlling, starting from said respective signal, the change of the position of said element for transmitting motion;

at least one switch for selective activation of said at least one sensor according to a command for changing the position of said element for transmitting motion with respect to said at least one gear wheel; and

said control unit being configured for preventing shifting of said at least one gear wheel (1) when the gear wheel is not in an angular position corresponding to said at least one given angular position, and (2) when the gear wheel is moving backwards, and then allowing change of position of said transmission element when said at least one gear wheel is rotated to a next angular position corresponding to said at least one given angular position.

36. (New) A process for controlling when gear shifting occurs in a transmission of a cycle having transmission elements comprising: (1) at least one sprocket coaxially mounted to hub of a rear wheel of the cycle, (2) a gear attached to a pedal crank, and (3) a transmission chain engaged with said sprocket and said gear, the process comprising the steps of:

Applicant: Campagnolo et al.
Application No.: 10/690,042

providing a sensor that detects a marker on at least one of the transmission elements, and has angular positions corresponding to no, forward, and rearward movement at least one of the transmission elements;

selectively activating said sensor according to a command request to initiate a shift;

preventing a shift when the sensor detects rearward movement of at least one of the transmission elements.

37. (New) The process of claim 36 wherein the transmission elements further comprise a chain tensioning element.

38. (New) A process for controlling when gear shifting occurs in a transmission of a cycle having transmission elements comprising: (1) at least one sprocket coaxially mounted to hub of a rear wheel of the cycle, (2) a gear attached to a pedal crank, and (3) a transmission chain engaged with said sprocket and said gear, the process comprising the steps of:

providing a sensor that detects a marker on at least one of the transmission elements, and has angular positions corresponding to no, forward, and rearward movement at least one of the transmission elements;

Applicant: Campagnolo et al.
Application No.: 10/690,042

selectively activating said sensor according to a command request to initiate a shift;

only allowing a shift when the sensor detects forward movement of at least one of the transmission elements.

39. (New) The process of claim 38 wherein the transmission elements further comprise a chain tensioning element.